PROGRESS REPORT

Blocking Heartworm Transmission

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SUMMARY: Morris Animal Foundation-funded researchers at the University of Pennsylvania are investigating how infection by certain bacteria decreases the ability of mosquitoes to transmit infectious larvae of *Dirofilaria immitis*, the agent of heartworm disease.

THE PROBLEM: Mosquitoes are required for heartworm transmission between dogs. Every year, more than 150,000 cases of canine heartworm disease are reported in the United States alone. Monthly preventive treatments for dogs have been widely available since the mid-1980s. However, *drug-resistant strains are on the rise*, highlighting the need for novel disease control strategies. The team hopes findings will provide a new approach to block the spread of the heartworm disease by targeting parasites in their mosquito host.

THE PROJECT: It's been known for several years that certain types of bacteria live in mosquitos, and that these bacteria influence the mosquitos' biological processes. In this project, the research team is building on preliminary data that showed that a certain type of bacteria, *Wolbachia*, blocked the development of transmission stage of *D. immitis*, the heartworm parasite. In this project, the team is expanding on this exciting finding.

PROJECT UPDATE: The team are studying a line of *Aedes aegypti* mosquitoes infected with *Wolbachia*. So far, they have defined the immune response of tissues where the larvae of *D. immitis* develop in the mosquito and identified key proteins made by infectious *D. immitis* larvae that may potentially modulate the mosquito immune response.

In the final stages of the study, the team will challenge the *Wolbachia*-infected mosquitoes with heartworm and then follow the progress of heartworm development in these mosquitoes. The team will compare results to two control groups of mosquitoes, one comprised of noninfected mosquitoes and another infected by *Wolbachia* but treated with antibiotics to eliminate the infection. Final analysis is expected by year end. Researchers hope these studies will show that *Wolbachia* infection can stunt worm development and elevate immune response in affected mosquitoes – supporting progress toward developing a novel way to block heartworm transmission by mosquitoes.

POTENTIAL IMPACT: If successful, the findings from this study will provide important groundwork for transitioning this technology to field populations of mosquitoes. **By addressing the mosquito population, the team hopes this technology may prevent dogs from becoming infected and reduce disease prevalence and spread in high-risk regions. The team also hopes this model will help inform strategies to combat other important mosquito-transmitted human diseases, including malaria and dengue fever.**

Thanks to the generous sponsors of this study!